University of Idaho
College of Engineering

HYDROTHERMAL TOMOGRAPHY DESIGN REVIEW

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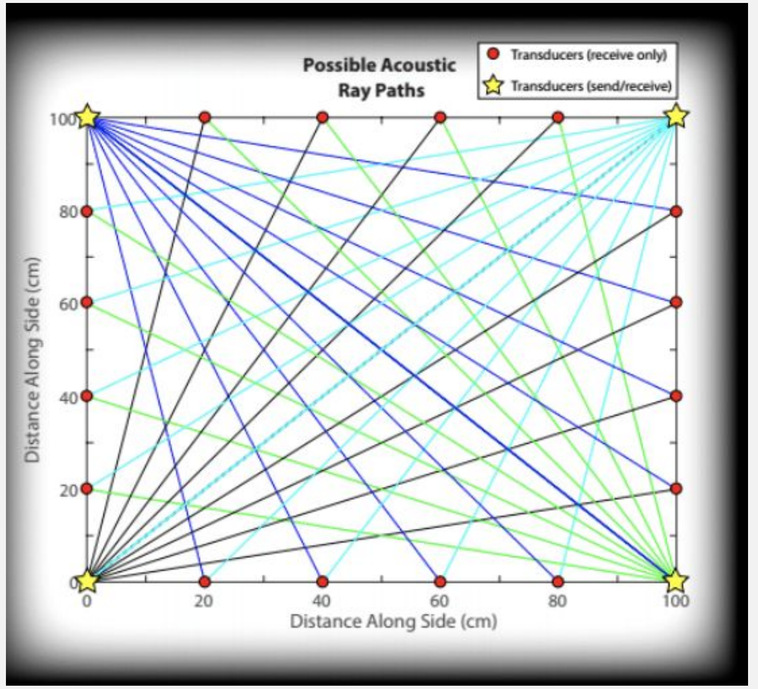
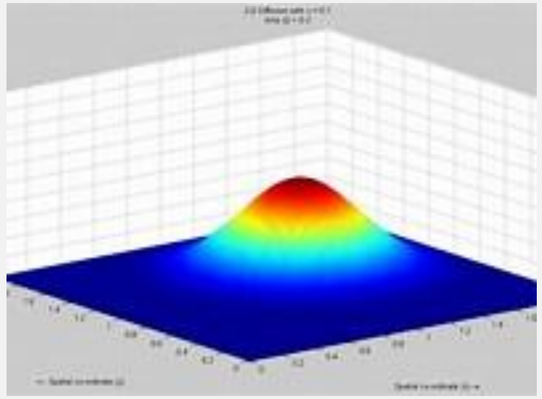
PROJECT GOAL

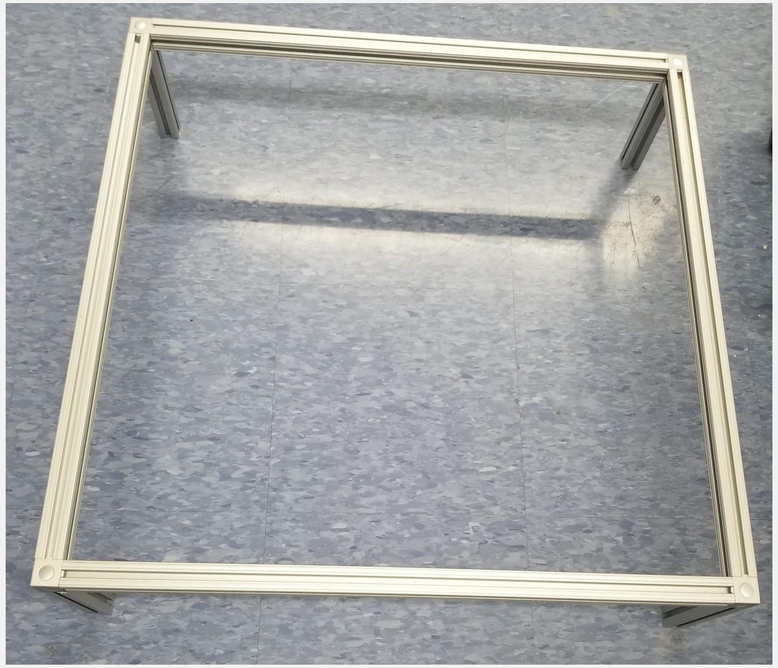
- Create 2D temperature map
- Correlate the time of flight to the temperature of the water
- Build system of sending a receiving transducers
- Electrical system that can measure time of flight and store data



DELIVERABLES

- Frame with Transducer Holders featuring well defined location
- Electrical System capable of sending and receiving the signals
- System capable of measuring and Recording travel time
- Suggestions to further the project



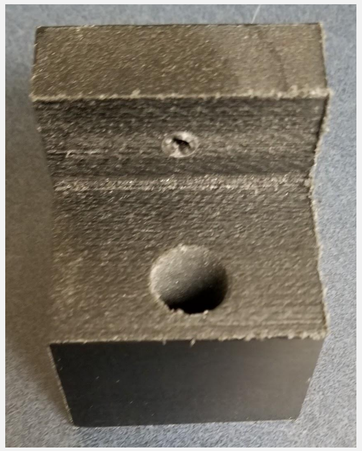


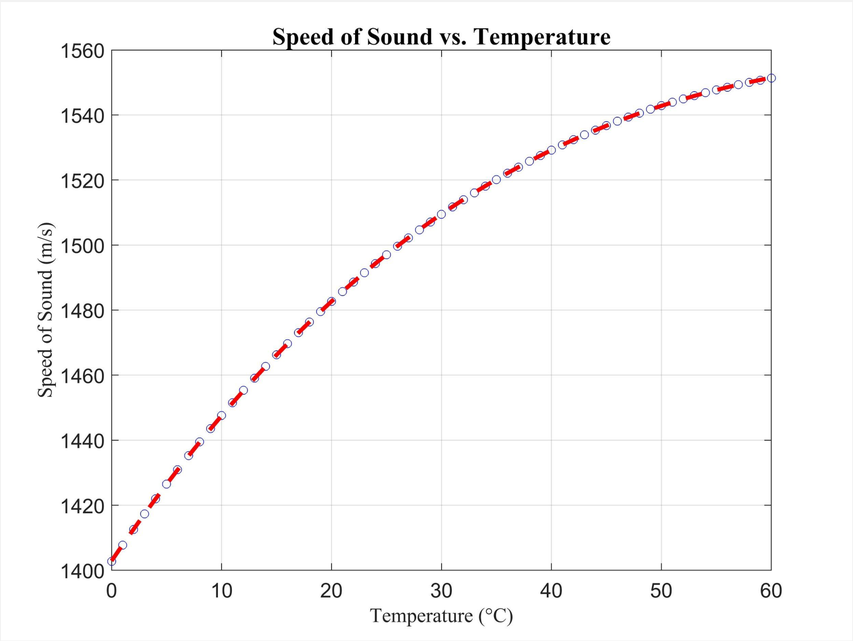
SPECIFICATIONS

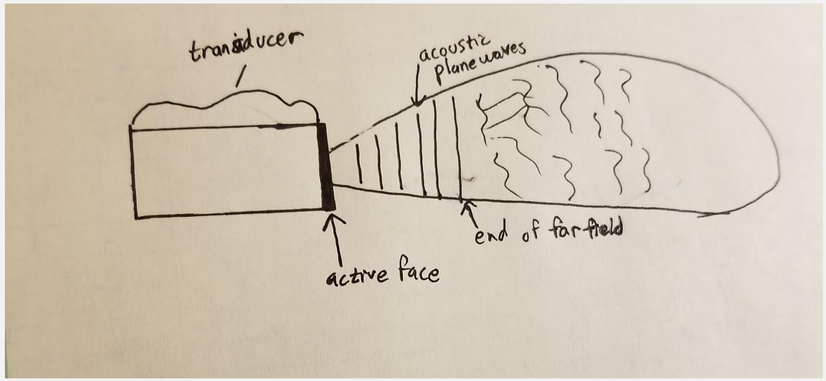
- Capture all wanted data in less than a second
- Have a resolution of time of flight between the range of 10µs to 0.01µs
- Automatically measure and record travel time
- Rigid Frame ensuring that the distance is well defined.
- Minimally or non-invasive system

PROJECT LEARNING

- Speed of sound in water
- Far-Field
- Transducer holder
- Propagation of Sound

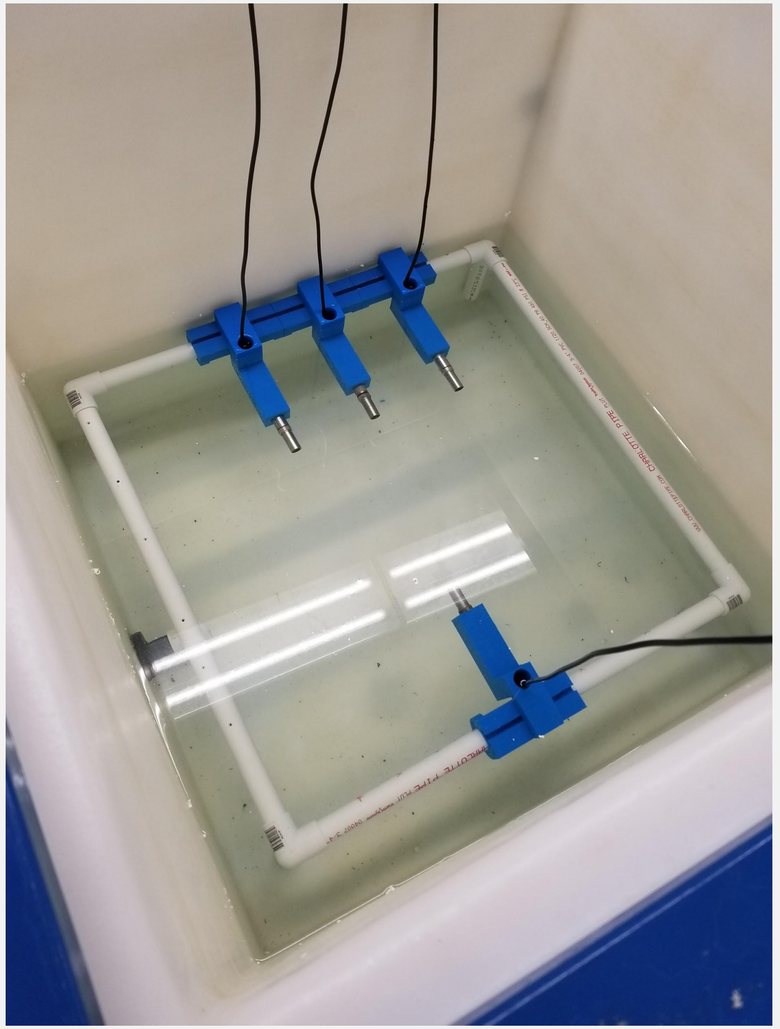






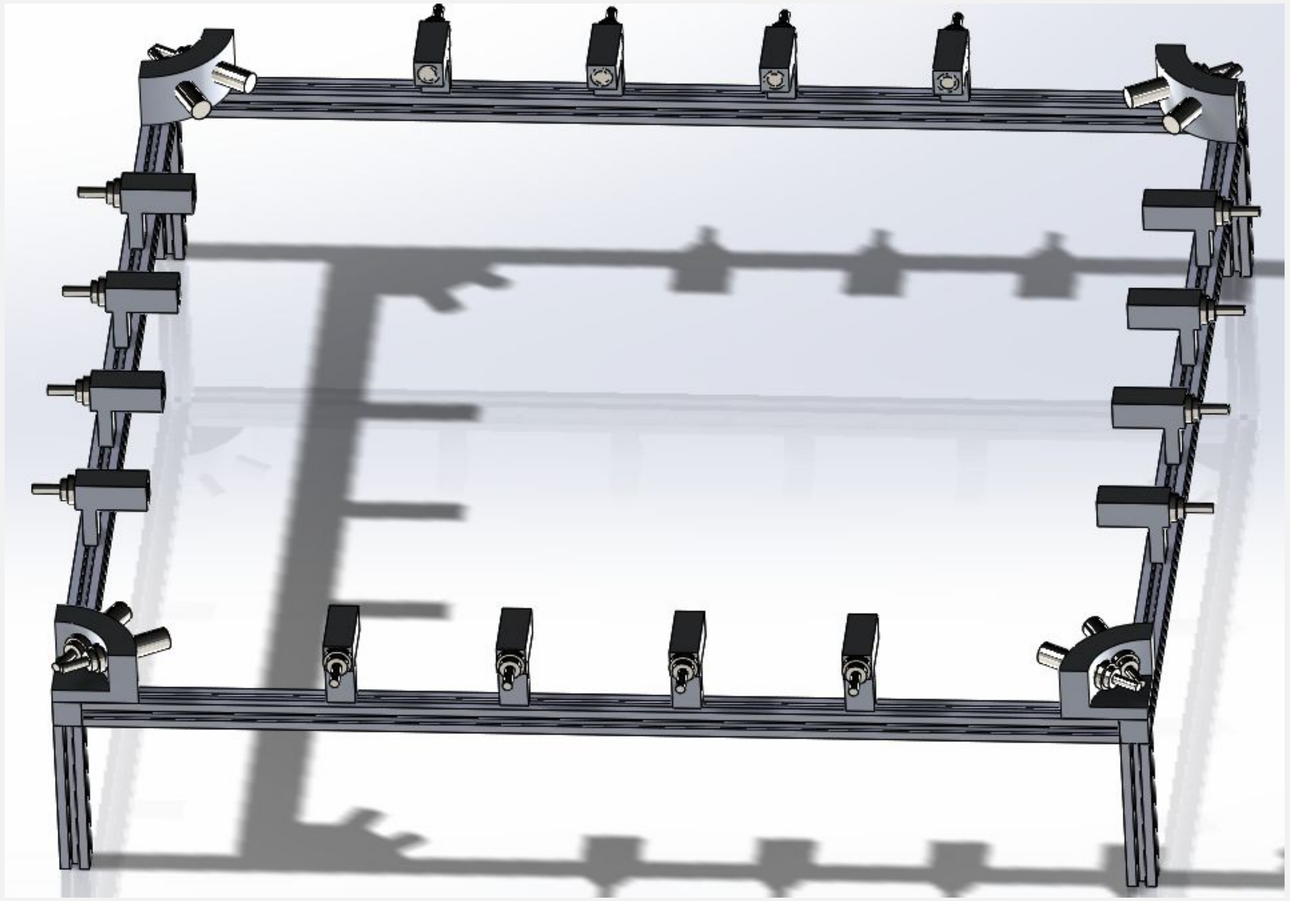
Current Progress

- 3D printed holders for Transducers
- Developing PIC32 code
- Verification of transducer signals
- Prototyping Transducer holders
- Receiving 3 signals and sending 1 signal



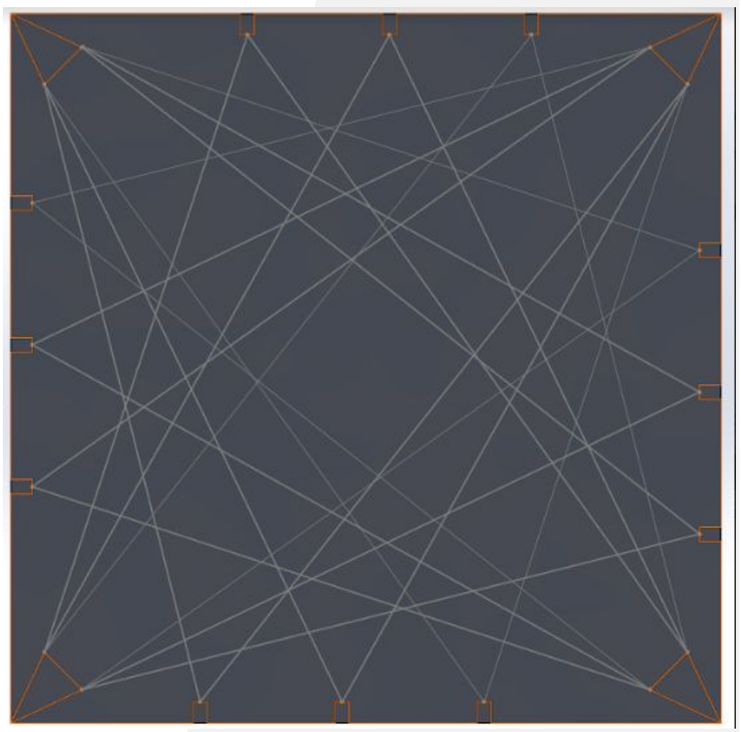
DESIGN IDEA #1

- Corner Transmitters
- Perpendicular Receivers
- Rigid 1x1 meter frame
- Power Supply (200V)



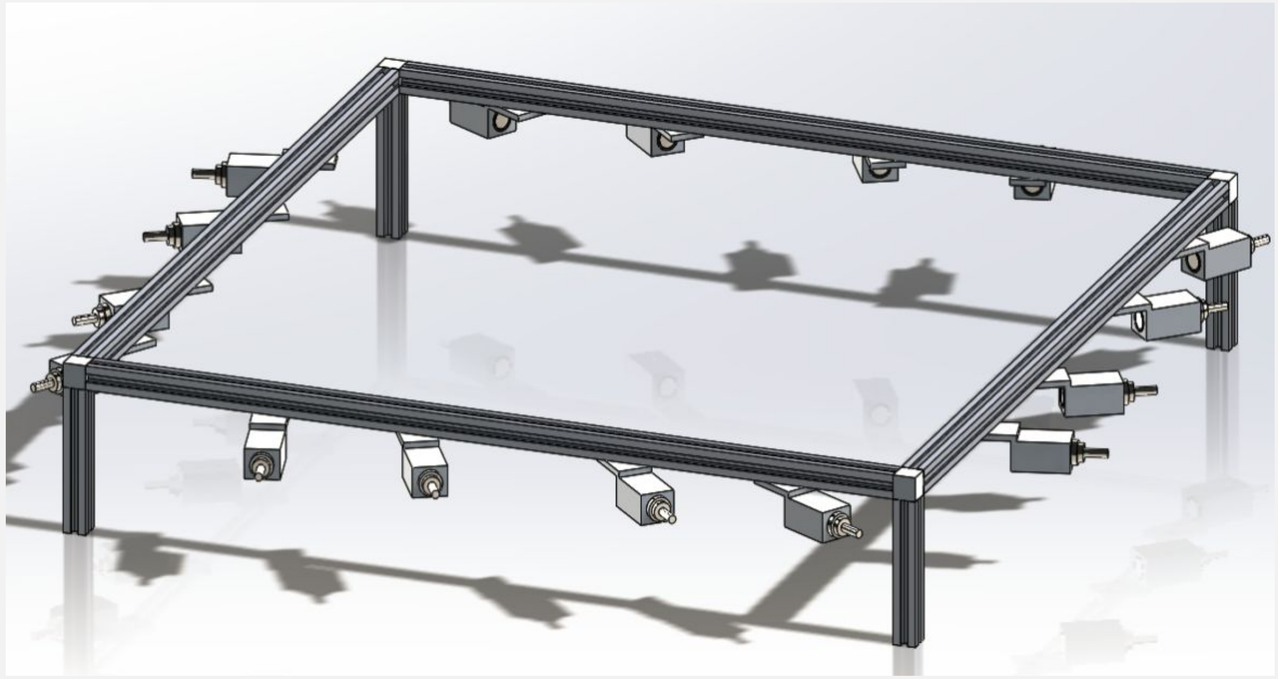
Configurations

- Increase the number of lines that cross
- Decrease size of the empty area



DESIGN IDEA #2

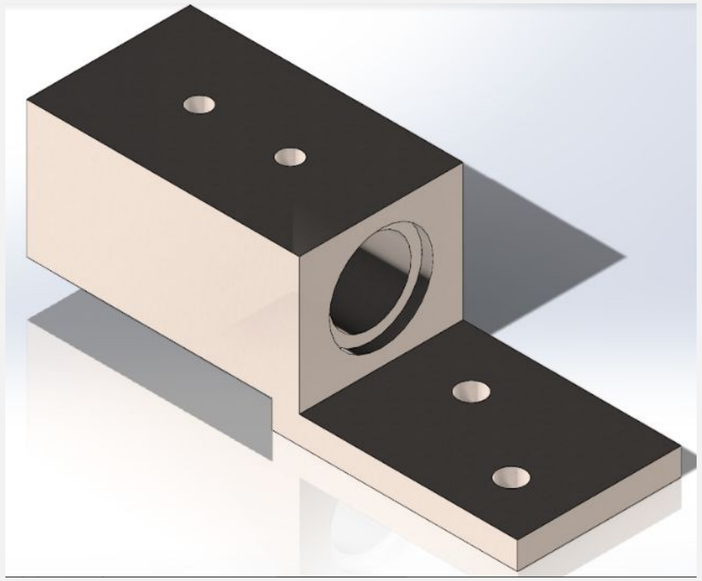
- Corner senders
- Directional Receivers
- Transducers on the bottom of the frame

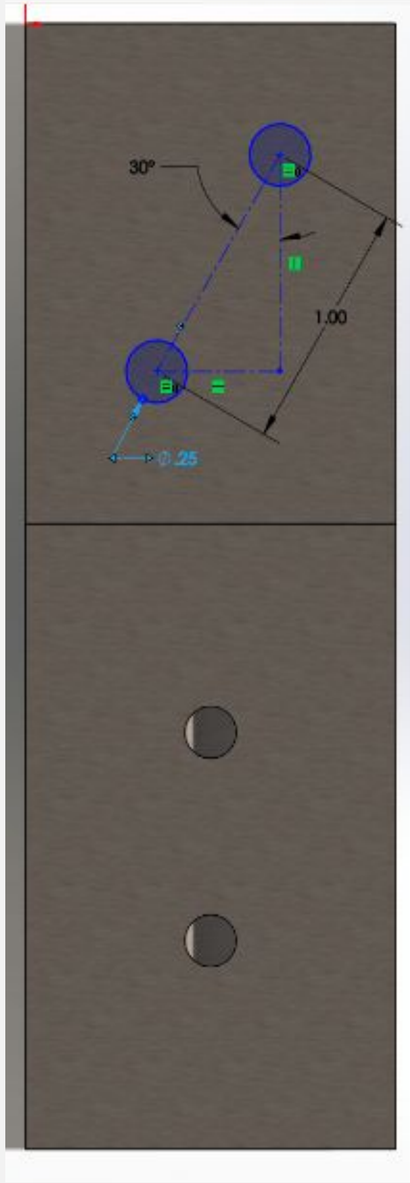


Transducer Holder

Specifications

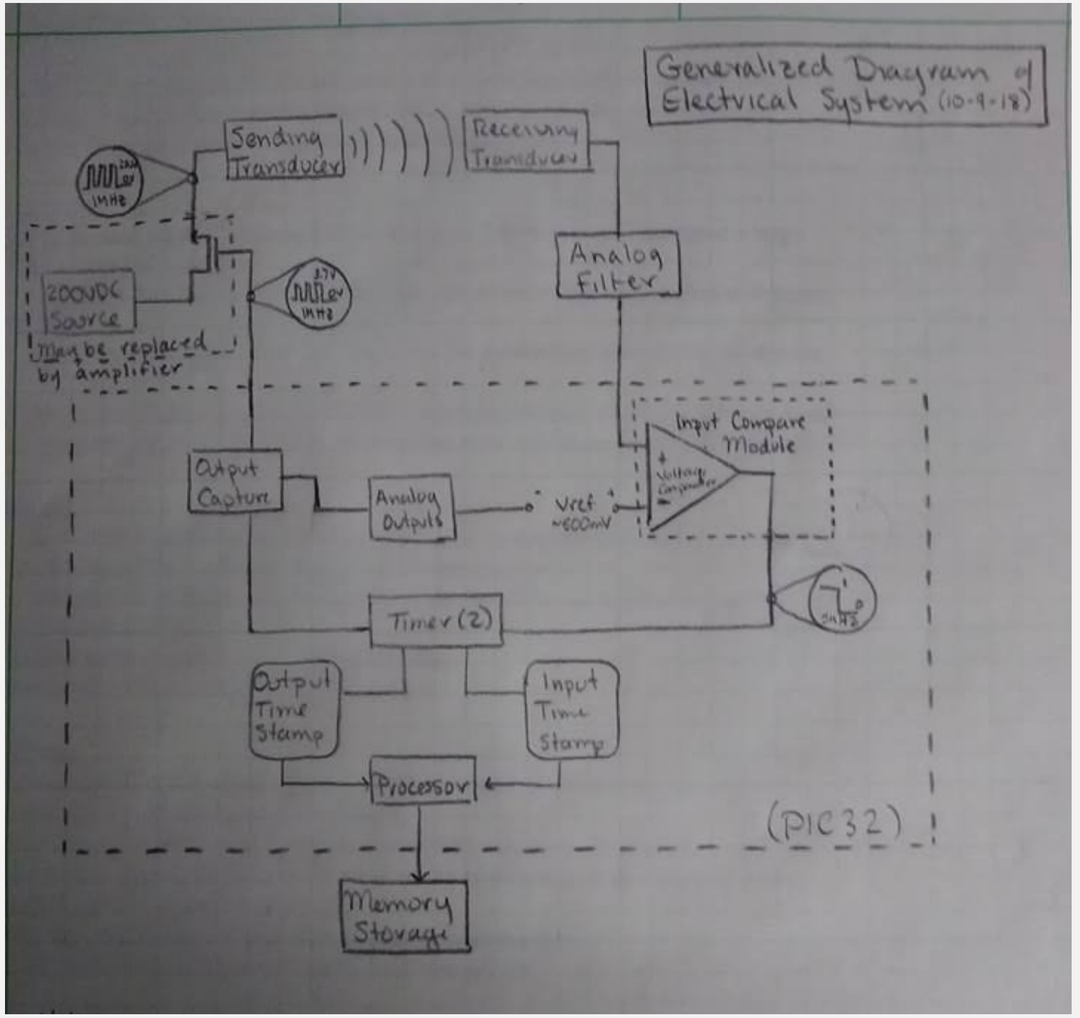
- Prevent transducer from moving once in place
- Capable of attaching to extruded aluminum frame
- Able to be set at precise angles
- Easy to machine





ELECTRICAL DESIGN FUNDAMENTALS

```
int main(void)
{
    while(1)
    {
        send_signals(send_transducer_set);
        hardware_delay(time_constant);
        receive_signals();
        process_data();
        store_data();
    }
}
```



PROJECTED BUDGET

- $7000 - $8400 Transducers
- $9000 Amplifier
- $600-$1000 Power Supply
- $50 Circuit Components
- $150 Frame
- $50 Wiring for transducers
- Total: $7850-$17650